ISSN 1809-127X (online edition)
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Check List
Journal of species lists and distribution

LISTS OF SPECIES

Checklist of the cicadas (Insecta: Hemiptera: Cicadidae) of Paraguay including new records for six species

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ABSTRACT: A current checklist of the Paraguayan cicada fauna is provided. The first records of *Fidicina torresi* Boulard and Martinelli, 1996, *Proarna dactyliophora* Berg, 1879, *Proarna praegracilis* Berg, 1881, *Dorisiana drewseni* (Stål, 1854), *Ariasa nigrovittata* Distant, 1905, and *Chonosia crassipennis* (Walker, 1858) for Paraguay are given. The new records increase the known cicada diversity 37.5% bringing the total number of cicada species reported in Paraguay to 22 species in 12 genera representing five tribes and three subfamilies of the family Cicadidae. There are currently no known endemic species.

INTRODUCTION

Cicadas are large insects that draw attention to themselves through the production of calling songs. These insects are often found in low population densities, generally do not cause significant agricultural damage, are highly mobile and are often difficult to catch. As a result, cicadas are generally taken as part of larger collection efforts and remain undetermined in various museum collections for extended periods of time (*e.g.*, new records below from specimens collected more than 100 years ago). I have published several papers describing the cicada fauna and providing new records of cicadas in various countries in the New World (Sanborn 2001a, b; 2006a, b; 2007a, b; 2008; 2009; 2010a, b). This series has been to provide information on the regional fauna to assist with further determinations while simultaneously expanding the information on the biogeography of individual cicada species. This work is a continuation of these studies describing new records for Paraguay along with the first listing of species known for the country.

MATERIALS AND METHODS

Specimens of six species representing new records for Paraguay were found among the undetermined cicadas or specimens sent to the author by Cornell University (CUIC), the University of Connecticut (UCMS), Louisiana State Arthropod Museum (LSAM), and the Museo Civico di Storia Naturale "Giacomo Doria" (MCSN). Additionally, photographs of one species that represented a new record for Paraguay were sent to the author by Paul Smith (Fauna Paraguay and Para La Tierra). Deposition of voucher specimens for the new records in the above collections and the author's collection (AFSC) are listed with each species. Records for other species inhabiting Paraguay were determined by searching the cicada bibliographies (Metcalf 1963a, b, c; Duffels and van der Laan 1985) and individual references can be found there. Data for geographical distribution of the species were collected from the cicada bibliographies and more recent literature (Ruffinelli 1970; Boulard and Martinelli 1996; Martinelli and Zucchi 1997; De Santis *et al.* 2007; Sanborn 2007a; 2007b; 2008; 2010a).

RESULTS AND DISCUSSION

The cicada bibliographies and more current literature provided reference to 16 species inhabiting Paraguay. New records for six additional species were found in the undetermined material of the above institutions.

List of new species

Fidicina torresi Boulard and Martinelli, 1996 (Subfamily Cicadinae, Tribe Fidicinini, Subtribe Fidicinina)

Geographical distribution. The species has been reported previously from Argentina and Brazil (Boulard and Martinelli 1996; Sanborn 2008).

Specimens examined. PARAGUAY, Sapaucay, 06 – I – 1902, 140, Heidemann Col., Cornell Univ., Lot 536, Cornell U., Lot. 732, Sub. 184, Fidicina tibicen, L. (1 male, CUIC); ibidem, 26 – XII – 1901, 140/2, Fidicina tibicen, L." (1 male, AFSC); ibidem, 20 – XII – 1901, ibidem, 06 – I – 1903, Heidemann Col., Cornell Univ., Lot 536, Sub., Cornell U., Lot. 732, Sub. 184 (1 female, AFSC); Puerto S. Pablo, II – 1937, Lapchinoscy (2 males, 3 females, MCSN, 1 male, 1 female, AFSC).

Proarna dactyliophora Berg, 1879 (Subfamily Cicadinae, Tribe Fidicinini, Subtribe Guyalnina)

Geographical distribution. The species has previously been reported from Argentina, Bolivia, Colombia, and Venezuela (Metcalf 1963a; De Santis *et al.* 2007; Sanborn 2007a; 2010a).

Specimen examined. PARAGUAY: Cordillera, Inst. Agro. Nac., Caacupe: 17 – 20 – I – 1983, E.G. Riley Col. (1 female, LSAM).

Proarna praegracilis Berg, 1881 (Subfamily Cicadinae, Tribe Fidicinini, Subtribe Guyalnina)

Geographical distribution. The species has previously been reported from Argentina and Bolivia (Metcalf 1963a).

Specimens examined. PARAGUAY, S. Bernardino, XI – 1898, G. Boggiani Col. (1 male, 3 females, MCSN, 1 female, AFSC). P^to^ 14 de Mayo, G. Boggiani Col., X – 1896" (5 females, MCSN, 3 females, AFSC); P^to^ 14 de Mayo, G. Boggiani Col., I – 1897" (1 female, MCSN); P^to^ 14 de Mayo, G. Boggiani Col., 1897 (1 female, MCSN); Laguna, X – 21 – 1978, K.L. Anderson Col. (1 female, UCMS); Laguna, X – 17 – 1978, K.L. Anderson Col. (1 female, UCMS); Iparoma, 21 – X – 1978, K.L. Anderson Col. (1 female, AFSC); ibidem, 23 – X – 1978 (6 females, UCMS, 4 females, AFSC); ibidem, 26 – X – 1978 (5 females, UCMS, 1 female, AFSC).

Dorisiana drewseni (Stål, 1854) (Subfamily Cicadinae, Tribe Fidicinini, Subtribe Guyalnina)

Geographical distribution. The species has previously been reported from Argentina, Uruguay, and Brazil (Metcalf 1963a; Ruffinelli 1970; Duffels and van der Laan 1985).

Specimens examined. PARAGUAY, Puerto S. Pablo, II – 1937, Lapchinoscy (2 males, 2 females, MCSN, 1 male, 1 female, AFSC).

Ariasa nigrovittata Distant, 1905 (Subfamily Cicadinae, Tribe Fidicinini, Subtribe Guyalnina)

Geographical distribution. The species has previously been reported from Argentina, Bolivia, and Brazil (Metcalf 1963a).

Specimens examined. PARAGUAY, Puerto S. Pablo, II – 1937, Lapchinoscy (2 males, 4 females, MCSN, 1 male, 2 females, AFSC).

Chonosia crassipennis (Walker, 1858) (Subfamily Tibicininae, Tribe Tettigadini)

Geographical distribution. *Chonosia crassipennis* has previously been reported from Argentina (Metcalf 1963c).

Specimen examined. Photographs of a male from the Departamento Boquerón, Parque Nacional Teniente Agripino Enciso, 3 – X – 2007 were sent to the author for determination by Paul Smith. The specimen was released because the photographer lacked a permit to retain it for a collection.

The new records bring the reported cicada fauna of Paraguay to 22 species in 12 genera from five tribes and three subfamilies of the family Cicadidae. The current list of species and their taxonomic position is provided in Table 1. However, there are some species listed which are questionable and it would be useful to have further verification of their existence in Paraguay.

For example, the references to *Zammara tympanum* (Fabricius, 1803) by Berg (1883) may actually represent *Z. strepens* Amyot and Audinet-Serville, 1843. I have identified specimens of *Z. strepens* collected across the Paraná River from Paraguay in Argentina and have seen specimens of *Z. strepens* in collections that have been misidentified as *Z. tympanum*. There is no indication of where the specimens were collected in Paraguay so it is difficult to determine if they represent the true *Z. tympanum* or misidentified *Z. strepens*. The taxon *Fidicina mannifera* (Fabricius, 1803) has a tumultuous past with respect to its application. Boulard and Martinelli (1996) separated multiple species of *Fidicina* and their new genus *Fidicinoides* from what had previously been identified as *F. mannifera* in various collections. It may be that the references to *F. mannifera* by Berg (1883) and Torres (1953) in Paraguay were actually the taxon now considered to be *F. torresi*. This is almost certainly the case with the Torres (1953) reference that discusses an outbreak of *F. mannifera* in Puerto Bemberg, Misiones, which is the type locality of *F. torresi* (Boulard and Martinelli 1996) and an area where I have personally collected *F. torresi*, and further supported by the specimen from Encarnación above. Similarly, *Dorisiana semilata*

Table 1. Taxonomic list of cicadas currently reported to inhabit Paraguay.

CICADIDAE Leach, 1815
Cicadinae Latrielle, 1802
Zammarini Distant, 1905
Zammara Amyot and Audinet-Serville, 1843
Zammara tympanum (Fabricius, 1803)
Fidicinini Distant, 1905
Fidicinina Distant, 1905
Fidicina Amyot and Audinet-Serville, 1843
Fidicina mannifera (Fabricius, 1803)
Fidicina torresi Boulard and Martinelli, 1996
Fidicina vitellina Jacobi, 1904
Guyalnina Boulard and Martinelli, 1996
Proarna Stål, 1864
Proarna dactyliophora Berg, 1879
Proarna praegracilis Berg, 1881
Prasinosoma Torres, 1963
Prasinosoma heidemanni (Distant, 1905)
Dorisiana Metcalf, 1952
Dorisiana drewseni (Stål, 1854)
Dorisiana semilata (Walker, 1850)
Dorisiana viridis (Olivier, 1790)
Ariasa Distant, 1905
Ariasa nigrovittata Distant, 1905
Guyalna Boulard and Martinelli, 1996
Guyalna bonaerensis (Berg, 1879)
Hyantiini Distant, 1905
Quesada Distant, 1905
Quesada gigas (Olivier, 1790)
Cicadettinae Buckton, 1889
Carinetini Distant, 1905
Carineta Amyot and Audinet-Serville, 1843
Carineta cingenda Distant, 1883
Carineta diardi (Guérin-Méneville, 1829)
Carineta fasciculata (Germar, 1821)
Carineta maculosa Torres, 1948
Carineta submarginata Walker, 1850
Carineta viridicollis (Germar, 1830)
Guaranisaria Distant, 1905
Guaranisaria dissimilis Distant, 1905
Tibicininae Distant, 1905
Tettigadini Distant, 1905
Chonosia Distant, 1905
Chonosia crassipennis (Walker, 1858)
Tibicinini Distant, 1905
Ahomana Distant, 1905
Ahomana neotropicalis Distant, 1905

(Walker, 1850) has been reported from Costa Rica to Argentina and includes several synonymized species (Metcalf 1963a). Some species, such as *Dorisiana viridis* were incorrectly synonymized to *D. semilata* in the past. It may be that the specimens reported as *D. semilata* may actually have been *D. viridis*, another species I have collected across the Paraná River from Paraguay in Argentina.

Given that more than 100 species of cicadas inhabit Argentina and Brazil, it is highly probably that the cicada fauna of Paraguay will continue to become more diverse as additional specimens are collected. The association of cicadas to specific plant communities (*e.g.*, Phillips and Sanborn 2007) combined with the phytogeographic regions shared by Argentina, Brazil, and Paraguay suggests that more of the species found in Argentina and/or Brazil will also eventually be found in Paraguay. In addition, none of the cicada species currently known from Paraguay are endemic, being that 21 species are also being found in Argentina and/or Brazil and the final species also being reported from Peru. There is still much to learn about the cicada fauna and biogeography within Paraguay as the majority of references to specimens inhabiting the country are in summary works without specific localities being provided (*e.g.*, Berg 1883; Uhler 1903; Jacobi 1907).

Acknowledgments: J. O'Donnell (UCMS), V. Bayless (LSAM), R. Hoebeck (CUIC), F. Penati and R. Poggi (MCSN), and P. Smith provided access to collections and specimens. D.H.B. Maccagnan and an anonymous reviewer made suggestions to improve the manuscript.

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Received: February 2011
Last Revised: June 2011
Accepted: June 2011
Published online: July 2011
Editorial responsibility: Matthew Smart